Simulations Results

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Outline

- Light output/threshold
- Light output/threshold vs. position
- Cell Sizes
- Sites – Ash River Orr-Buyck

Effect of Light Level, Threshold

- Define 6 light level scenarios
  - 1 10pe far end, threshold 10pe
  - 2 15pe far end, threshold 10pe
  - 3 20pe far end, threshold 20pe
  - 4 20pe far end, threshold 15pe
  - 5 20pe far end, threshold 10pe
  - 6 25pe far end, threshold 20pe
- Run with PJL reconstruction and analysis more or less as at the time of the last PAC submission
- Redigitize hits changing light level and threshold
  - Adjust Total pulse height cut (scaled by light level)

Run Conditions

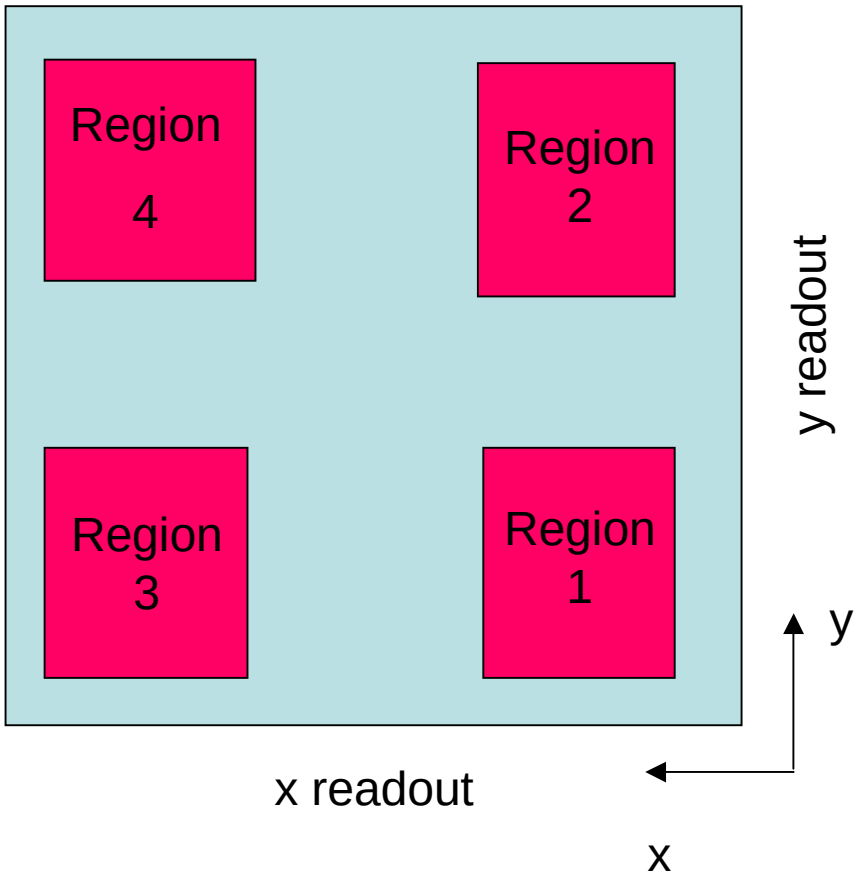
- Run with PJL reconstruction and analysis more or less as at the time of the last PAC submission
- Redigitize hits changing light level and threshold
  - Adjust Total pulse height cut (scaled by light level)

Relative FoM

- Standard Analysis
- Relative FoM
- Statistical Error 1.5%

thresh\pe	*10*	*15*	*20*	*25*
10	0.95	1.00	1.02	**1.00**
15			1.00	
20			0.98	1.00

Effect of Position, Light Level, Threshold



- Define 4 regions
  - 1 -7.5 -2.5m -7.5 -2.5m
  - 2 -7.5 -2.5m 2.5 7.5m
  - 3 2.5 7.5m -7.5 -2.5m
  - 4 2.5 7.5m 2.5 7.5m
- Define 6 light level scenarios
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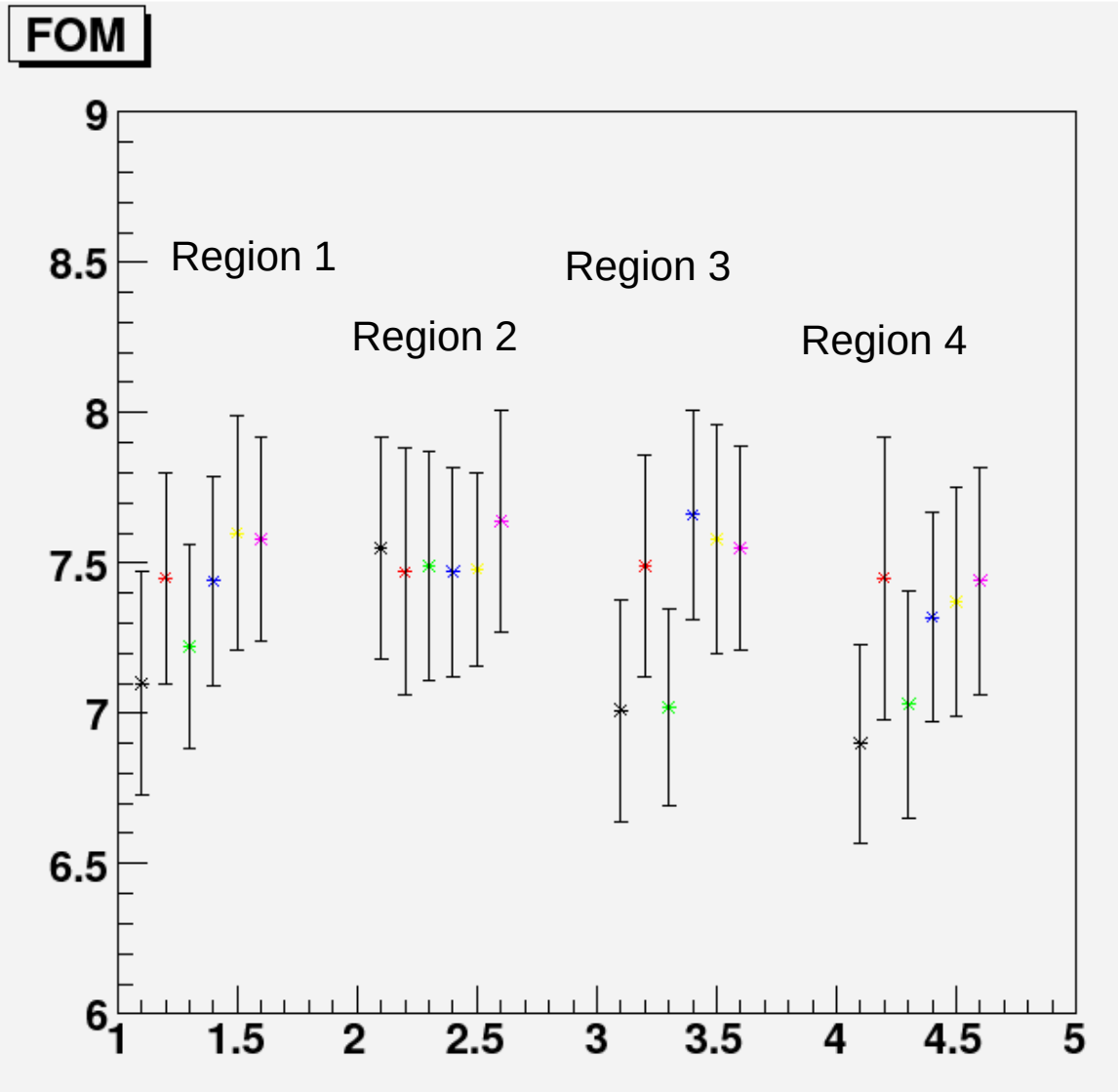
  - 5 20pe far end, threshold 10pe
  - 6 25pe far end, threshold 20pe

Run Conditions

- Run with PJL reconstruction and analysis more or less as at the time of the last PAC submission
- Run separately for each region, FOM optimised for each region and light level, changing only
  - Total pulse height cut
  - Likelihood selection parameters

FOM



Light 10, threshold 10

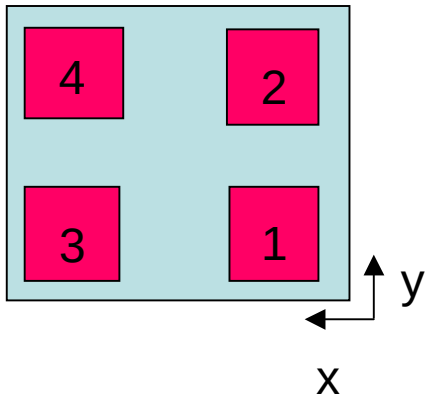
Light 15, threshold 10

Light 20, threshold 20

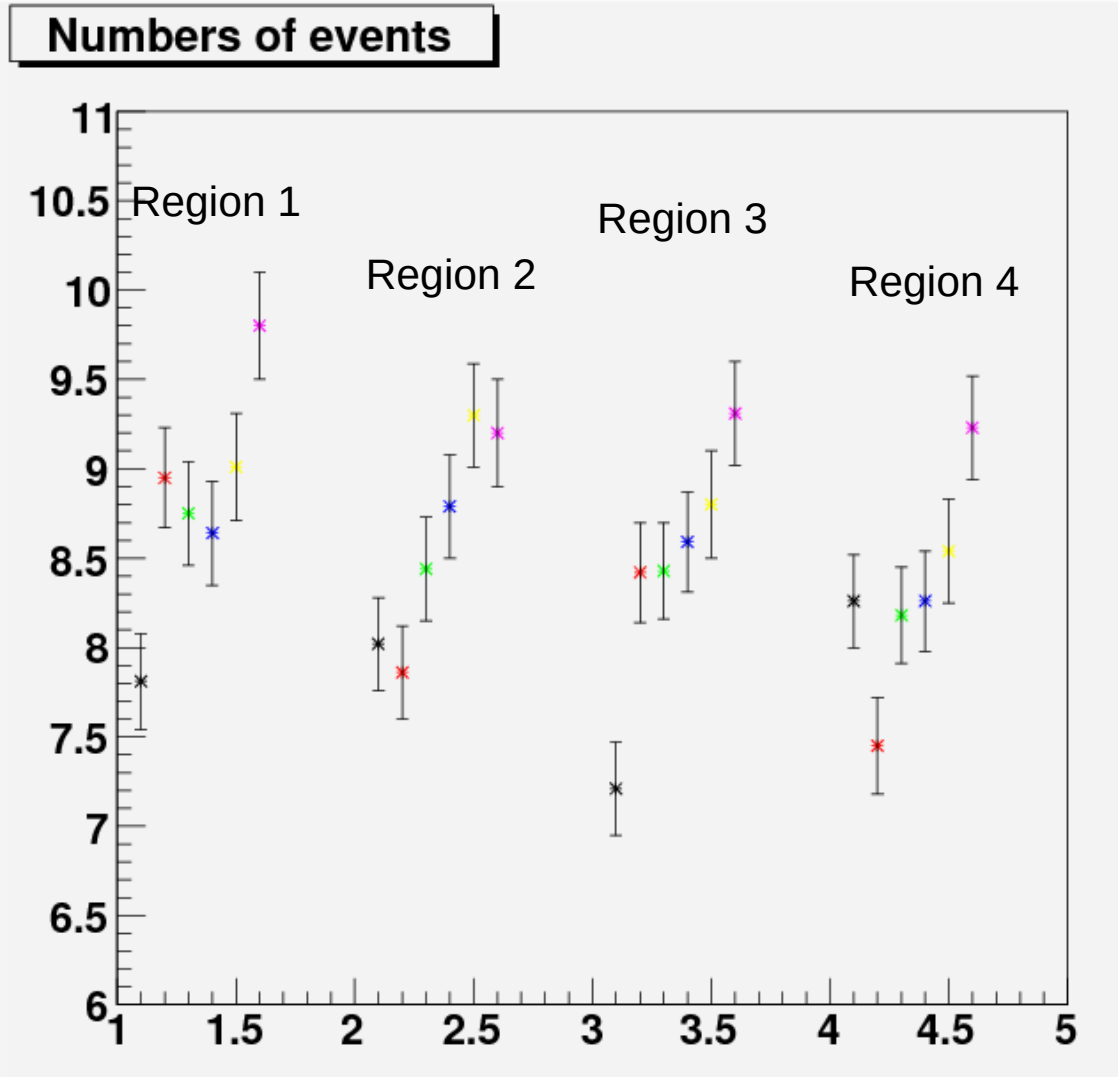
Light 20, threshold 15

Light 20, threshold 10

Light 25, threshold 20



Numbers of Selected ν_e Events



Light 10, threshold 10

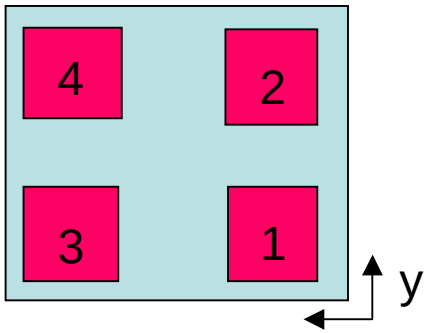
Light 15, threshold 10

Light 20, threshold 20

Light 20, threshold 15

Light 20, threshold 10

Light 25, threshold 20



Cell Size Variations

- Using pe/thresh of 25/15, analyzed several configurations

		Width (cm)		
	3.87	5.23	7.95	12.05
4.5	A	B	E	-
6.0	C	D	-	I
Depth(cm) 9.0	F	-	G	-
15.0	H	-	-	J

Relative FoM vs. Cell Size

- PJL Standard analysis
- Statistical accuracy 1.5%

depth\width	*3.87*	*5.23*	*7.95*	*12.05*
4.5	**1.00**	0.99	0.98	
6	1.00	1.02		0.87
9	0.92		0.92	
15	0.80			0.71

Comparison Ash River – Orr-Buyck

- Mark has produced beam spectra for 12km off-axis at Orr-Buyck
- Compare with our standard 12km off-axis at Ash River
- Minimal reoptimisation, just likelihood parameters, distributions are very similar
- Assume old experiment parameters, Mark's beam is for 3.7 10^{13} /pulse, 1.9 sec rep-rate, 5 years in a 25kton detector.

	ν_e	Background	FOM
Orr-Buyck	74.6±1.1	12.3±0.4	21.3±0.5
Ash River	78.2±1.2	13.4±0.5	21.4±0.5

- As expected, no significant difference

Conclusion

- Less light, higher threshold means fewer selected ν_e events
- Position in the detector is not very sensitive, only a small loss of events at far side
- The FOM is not very sensitive to anything
  - Fewer selected events but also fewer selected background events
- The FoM is sensitive to cell size, eventually.